CROPS RESEARCH

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INTER- AND INTRA-GENERIC HYBRIDS

An Exhibit of Crosses Between Species of Triticum, Secale, Aegilops, and Haynaldia

William J. Sando 1/

The 112 figures in this exhibit represent only part of the many successful inter- and intra-generic hybrids made by the writer. Interest in the hybrids exists among cytologists, students of evolution, taxonomists, and geneticists. Plant breeders regard such species crosses as a means to broaden the base of germ plasm for future grain improvement. Some of the results with these particular hybrids were reported in the Journal of Heredity (26:229-232, 1935).

A relatively small number of hybrids was self-fertile. The greatest number of fertile crosses came from combining Aegilops and Haynaldia with certain emmer wheats. Spontaneous amphiploids, listed in the figures as constant hybrids, occurred in a few crosses. These crosses were made before the advent of colchicine for doubling the number of chromosomes; however, many have been repeated and rendered fertile by treatment.

To serve as a guide and to help identify the types of hybrids obtained from the diverse crosses, the seven frames in the exhibit are reproduced here as Plates I to VII. Each Plate contains 16 figures that are numbered 1 to 16 with 1 in the upper left and 16 in the lower right. The F_1's are shown in the center of each figure with corresponding parental forms on either side.

1/ Agronomist, Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture, Plant Industry Station, Beltsville, Md.

Agricultural Research Service
U. S. DEPARTMENT OF AGRICULTURE

PLATE I

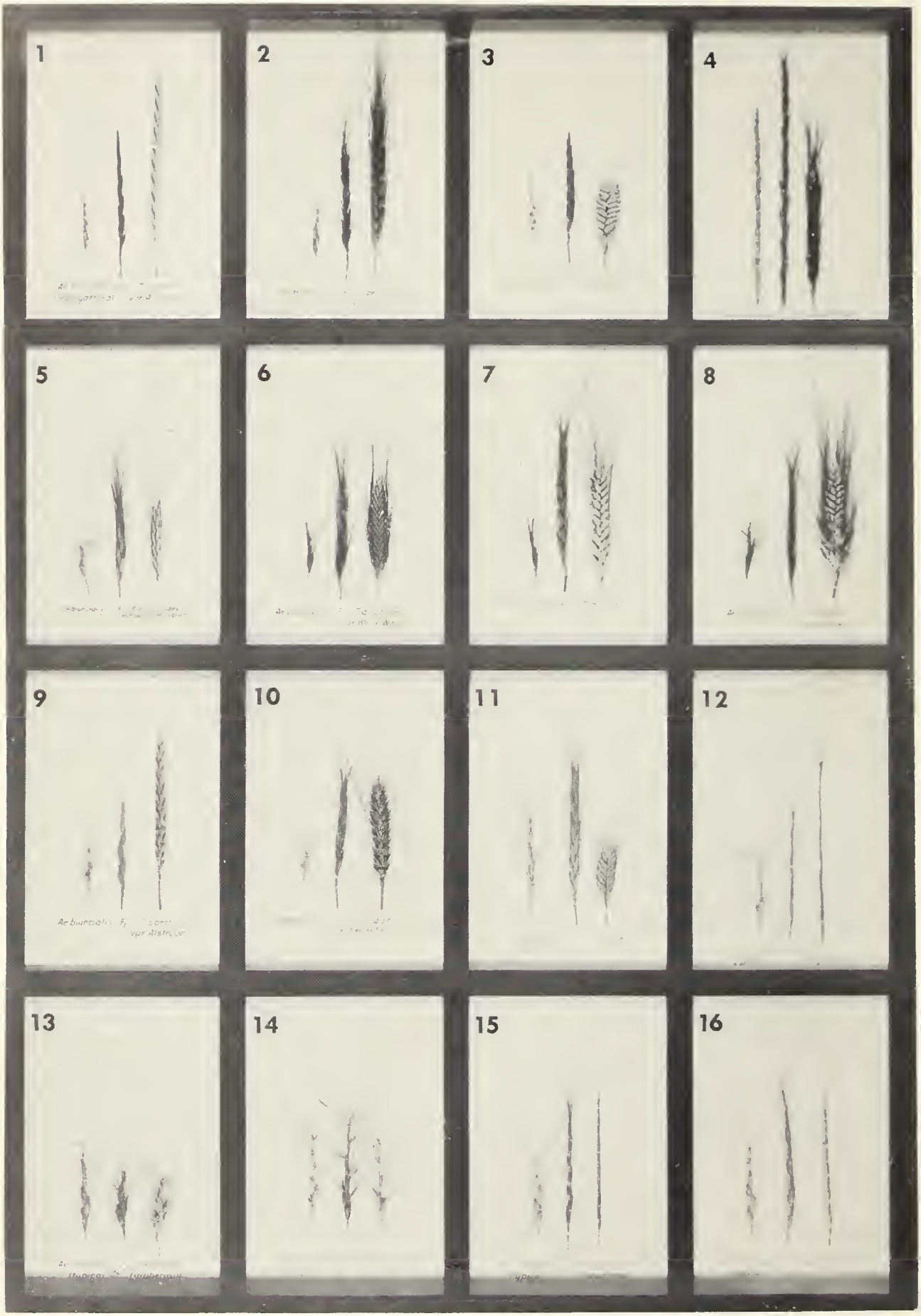

PLATE I

Aegilops triuncialis, Ae. crassa, and Ae. biuncialis crossed with species of Triticum, and Ae. triuncialis crossed with other species of Aegilops. Each figure shows the parental types (left and right) and the F_1 (center).

Fig. 1 Ae. triuncialis (brachyathera), F_1, T. spelta (Alstroum)

Fig. 2 Ae. triuncialis, F_1, T. persicum (fulginosum)

Fig. 3 Ae. triuncialis (brachyathera), F_1, T. compactum (Coppei)

Fig. 4 Ae. crassa (rufescens), F_1, T. persicum (fulginosum)

Fig. 5 Ae. biuncialis, F_1, T. dicoccoides (spontaneonigrum)

Fig. 6 Ae. biuncialis, F_1, T. dicoccum (Black Winter)

Fig. 7 Ae. biuncialis, F_1, T. durum

Fig. 8 Ae. biuncialis, F_1, T. turgidum (Alaska)

Fig. 9 Ae. biuncialis, F_1, T. spelta (Alstroum)

Fig. 10 Ae. biuncialis, F_1, T. vulgare (Velvet Chaff)

Fig. 11 Ae. triuncialis (typica), F_1, T. timofeevi

Fig. 12 Ae. triuncialis (typica), F_1, Ae. aucheri (virgata)

Fig. 13 Ae. triuncialis (typica), F_1, Ae. ovata (gibberosa)

Fig. 14 Ae. triuncialis (typica), F_1, Ae. columnaris

Fig. 15 Ae. triuncialis (typica), F_1, Ae. cylindrica (feruginea)

Fig. 16 Ae. triuncialis (typica), F_1, Ae. ventricosa

PLATE II

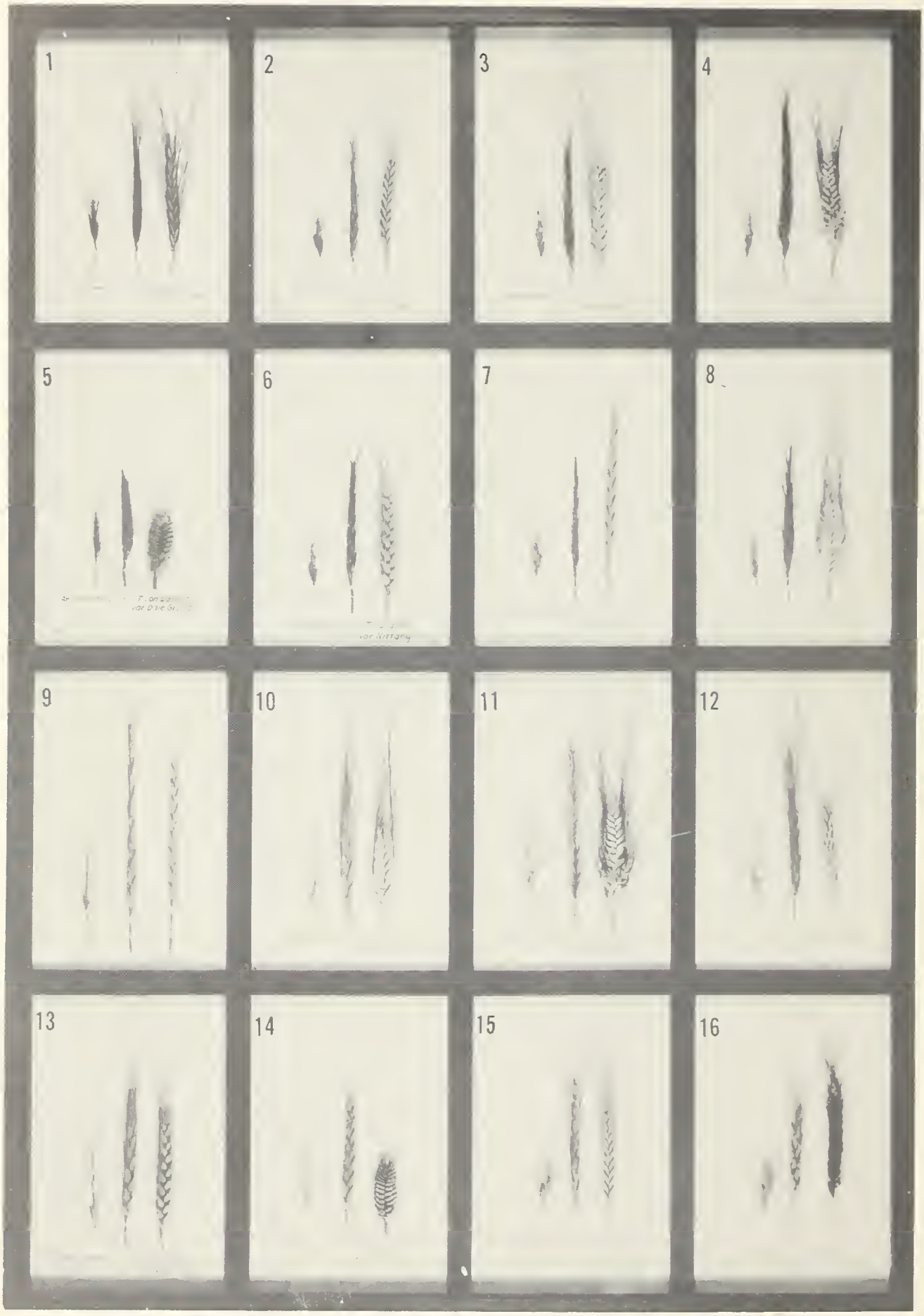

PLATE II

Aegilops variabilis, Ae. columnaris, and Ae. ovata crossed with species of Triticum.

Fig. 1 Ae. variabilis, F_1, T. dicoccoides (spontaneonigrum)

Fig. 2 Ae. variabilis, F_1, T. dicoccum (Khapli)

Fig. 3 Ae. variabilis, F_1, T. durum (Arnautka)

Fig. 4 Ae. variabilis, F_1, T. turgidum (Alaska)

Fig. 5 Ae. variabilis, F_1, T. compactum (Dale Gloria)

Fig. 6 Ae. variabilis, F_1, T. vulgare (Nittany)

Fig. 7 Ae. variabilis, F_1, T. spelta (Alstroum)

Fig. 8 Ae. variabilis, F_1, T. polonicum

Fig. 9 Ae. columnaris, F_1, T. spelta (Alstroum)

Fig. 10 Ae. columnaris, F_1, T. polonicum (C.I. 7070)

Fig. 11 Ae. columnaris, F_1, T. turgidum (Alaska)

Fig. 12 Ae. columnaris, F_1, T. dicoccoides (spontaneonigrum)

Fig. 13 Ae. columnaris, F_1, T. vulgare (Nittany)

Fig. 14 Ae. columnaris, F_1, T. compactum (Coppei)

Fig. 15 Ae. ovata (gibberosa), F_1, T. dicoccum (Khapli)

Fig. 16 Ae. ovata (gibberosa), F_1, T. persicum (fulginosum)

PLATE III

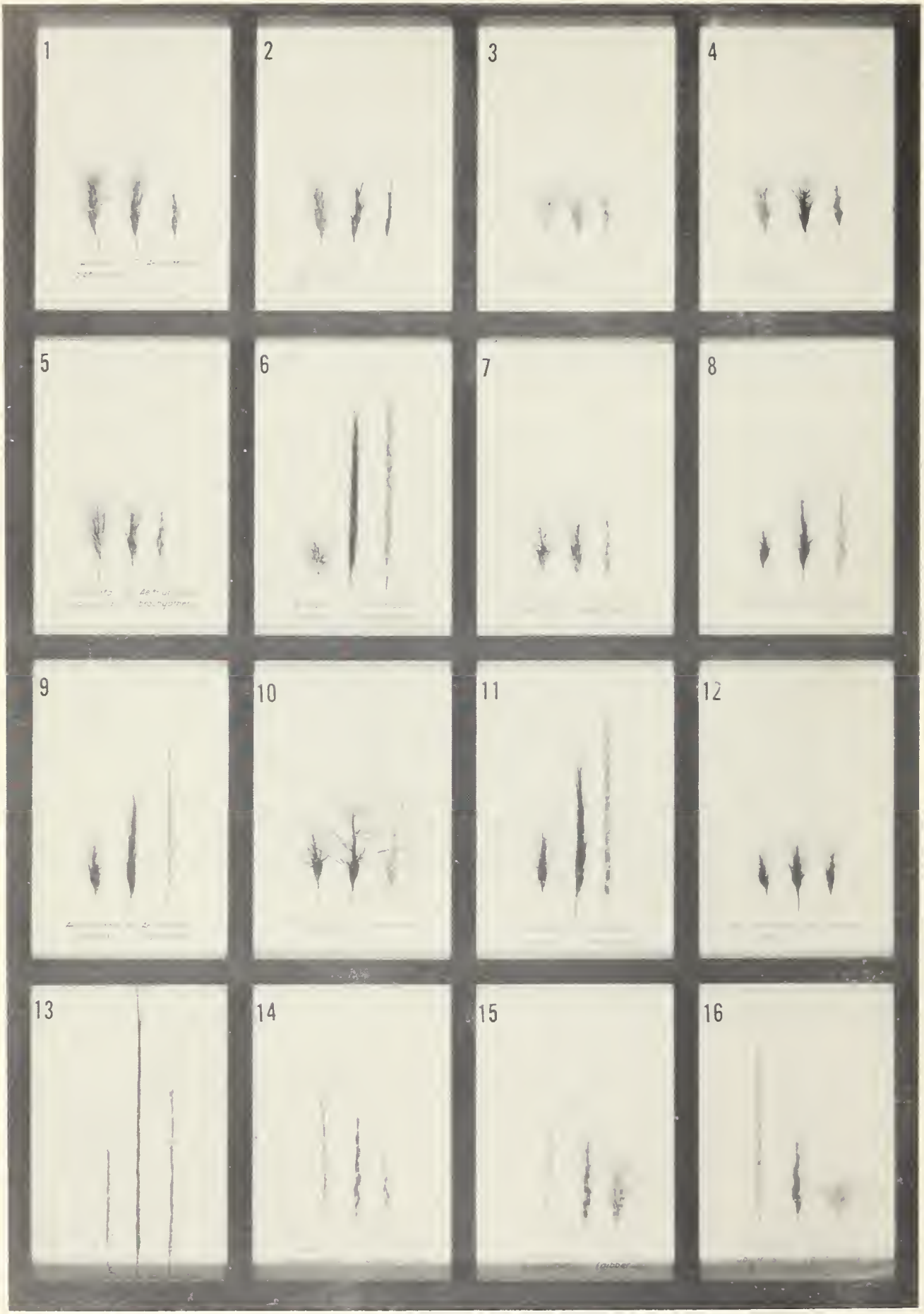

PLATE III

Crosses among species of Aegilops

Fig. 1 Ae. ovata (gibberosa), F_1, Ae. uniaristata

Fig. 2 Ae. ovata (gibberosa), F_1, Ae. comosa

Fig. 3 Ae. ovata (globulosa), F_1, Ae. biuncialis

Fig. 4 Ae. ovata (gibberosa), F_1, Ae. variabilis

Fig. 5 Ae. ovata (gibberosa), F_1, Ae. triuncialis (brachyathera)

Fig. 6 Ae. ovata (nova), F_1, Ae. crassa (rubiginosa)

Fig. 7 Ae. triaristata (contorta), F_1, Ae. triuncialis (brachyathera)

Fig. 8 Ae. triaristata, F_1, Ae. triuncialis (typica)

Fig. 9 Ae. triaristata (recta), F_1, Ae. cylindrica (rubiginosa)

Fig. 10 Ae. triaristata (recta), F_1, Ae. columnaris

Fig. 11 Ae. triaristata (recta), F_1, Ae. crassa (rufescens)

Fig. 12 Ae. triaristata (recta), F_1, Ae. variabilis

Fig. 13 Ae. caudata (polyathera), F_1, Ae. aucheri (virgata)

Fig. 14 Ae. caudata (polyathera), F_1, Ae. triuncialis (brachyathera)

Fig. 15 Ae. caudata (polyathera), F_1, Ae. ovata (gibberosa)

Fig. 16 Ae. cylindrica (rubiginosa), F_1, Ae. ovata (globulosa)

PLATE IV

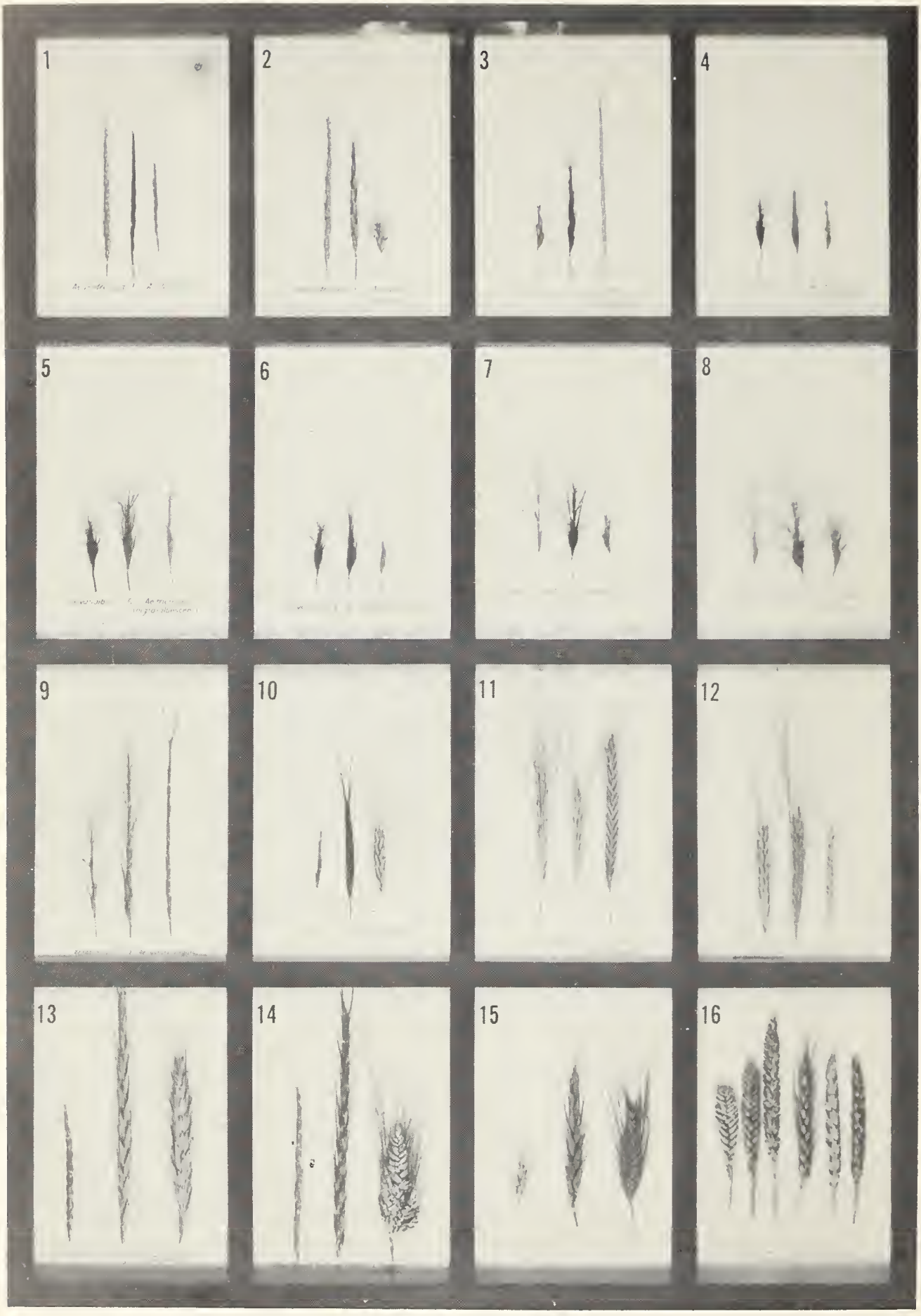

PLATE IV

Crosses among species of Aegilops and with Triticum; also Secale fragile x S. cereale and amphiploids from wheat-rye and wheat-aegilops crosses.

Fig. 1 Ae. ventricosa, F_1, Ae. bicornis

Fig. 2 Ae. ventricosa, F_1, Ae. ovata (nova)

Fig. 3 Ae. variabilis, F_1, Ae. cylindrica (rubiginosa)

Fig. 4 Ae. variabilis, F_1, Ae. triuncialis (brachyathera)

Fig. 5 Ae. variabilis, F_1, Ae. triuncialis (nigro-albescens)

Fig. 6 Ae. variabilis, F_1, Ae. uniaristata

Fig. 7 Ae. columnaris, F_1, Ae. variabilis

Fig. 8 Ae. columnaris, F_1, Ae. ovata (gibberosa)

Fig. 9 Ae. columnaris, F_1, Ae. aucheri (virgata)

Fig. 10 Ae. comosa, F_1, T. dicoccoides (spontaneonigrum)

Fig. 11 S. fragile, F_1, S. cereale (Abruzzes)

Fig. 12 T. dicoccoides (spontaneonigrum), F_1, T. aegilopoides

Fig. 13 Ae. ventricosa, "Constant" hybrid F_3, T. polonicum (W. Polish)

Fig. 14 Ae. ventricosa, "Constant" hybrid F_3, T. turgidum (Alaska)

Fig. 15 Ae. ovata (gibberosa), "Constant" hybrid F_3, T. dicoccum (Bl. Winter)

Fig. 16 Self-fertile F_3 types from the cross (T. compactum x T. monococcum) F_1 x (T. vulgare x S. cereale) F_4, Self-fertile F_4 types from the cross (Ae. triuncialis x T. turgidum) F_1 x T. vulgare (Hard Federation)

PLATE V

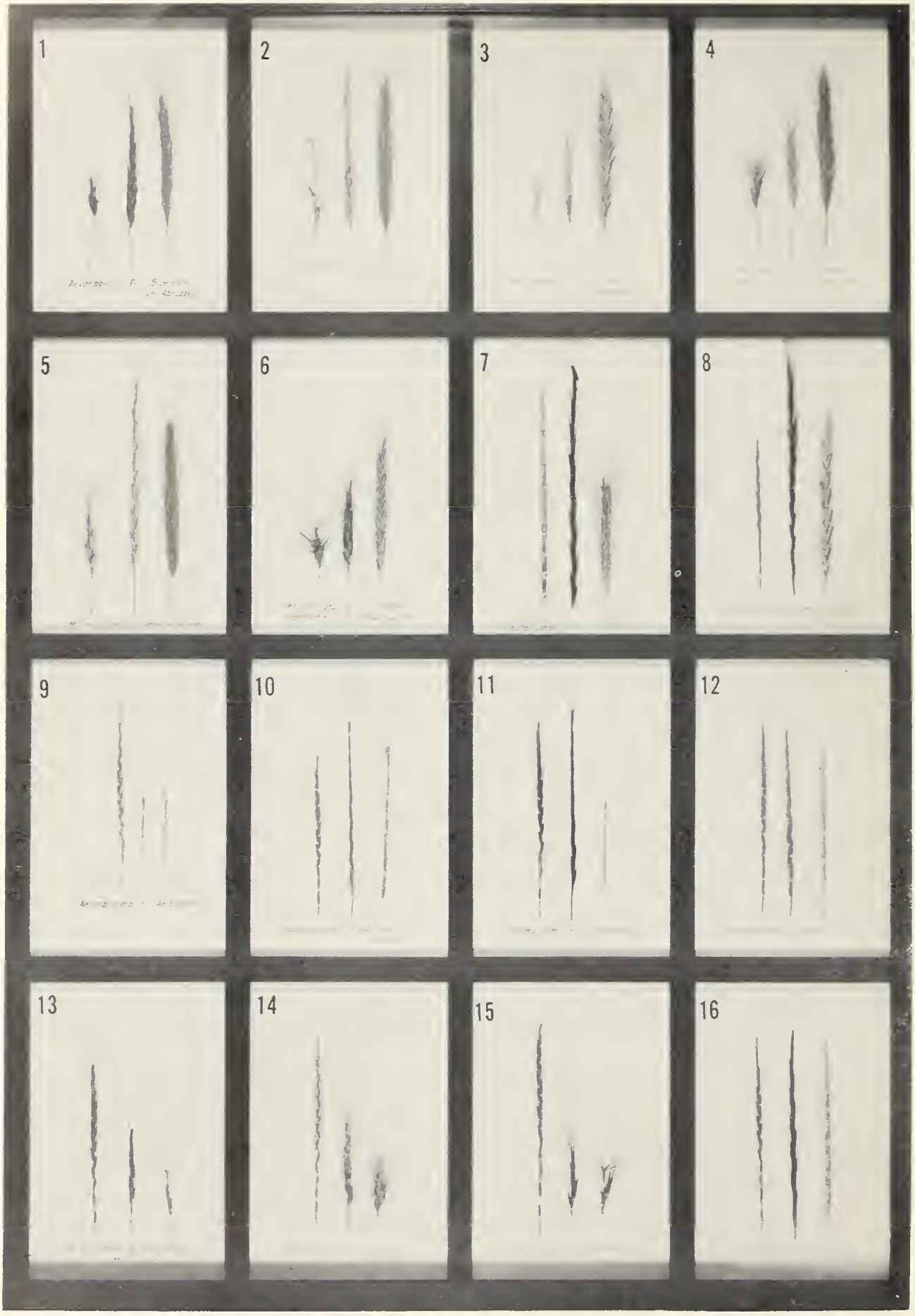

PLATE V

Crosses of Secale cereale and S. fragile with species of Aegilops; also crosses among species of Aegilops

Fig. 1 Ae. variabilis, F_1, S. cereale (Abruzzes)

Fig. 2 Ae. columnaris, F_1, S. cereale (Abruzzes)

Fig. 3 Ae. biuncialis, F_1, S. cereale (Abruzzes)

Fig. 4 Ae. ovata (gibberosa), F_1, S. cereale (Abruzzes)

Fig. 5 Ae. triuncialis (typica), F_1, S. cereale (Abruzzes)

Fig. 6 Ae. triaristata (contorta), F_1, S. cereale (Abruzzes)

Fig. 7 Ae. crassa (rufescens), F_1, S. fragile

Fig. 8 Ae. longissima, F_1, Ae. speltoides (ligustica)

Fig. 9 Ae. longissima, F_1, Ae. bicornis

Fig. 10 Ae. longissima, F_1, Ae. aucheri (virgata)

Fig. 11 Ae. longissima, F_1, Ae. caudata

Fig. 12 Ae. longissima, F_1, Ae. ventricosa

Fig. 13 Ae. longissima, F_1, Ae. comosa

Fig. 14 Ae. longissima, F_1, Ae. ovata (gibberosa)

Fig. 15 Ae. longissima, F_1, Ae. biuncialis

Fig. 16 Ae. longissima, F_1, Ae. crassa (rufescens)

PLATE VI

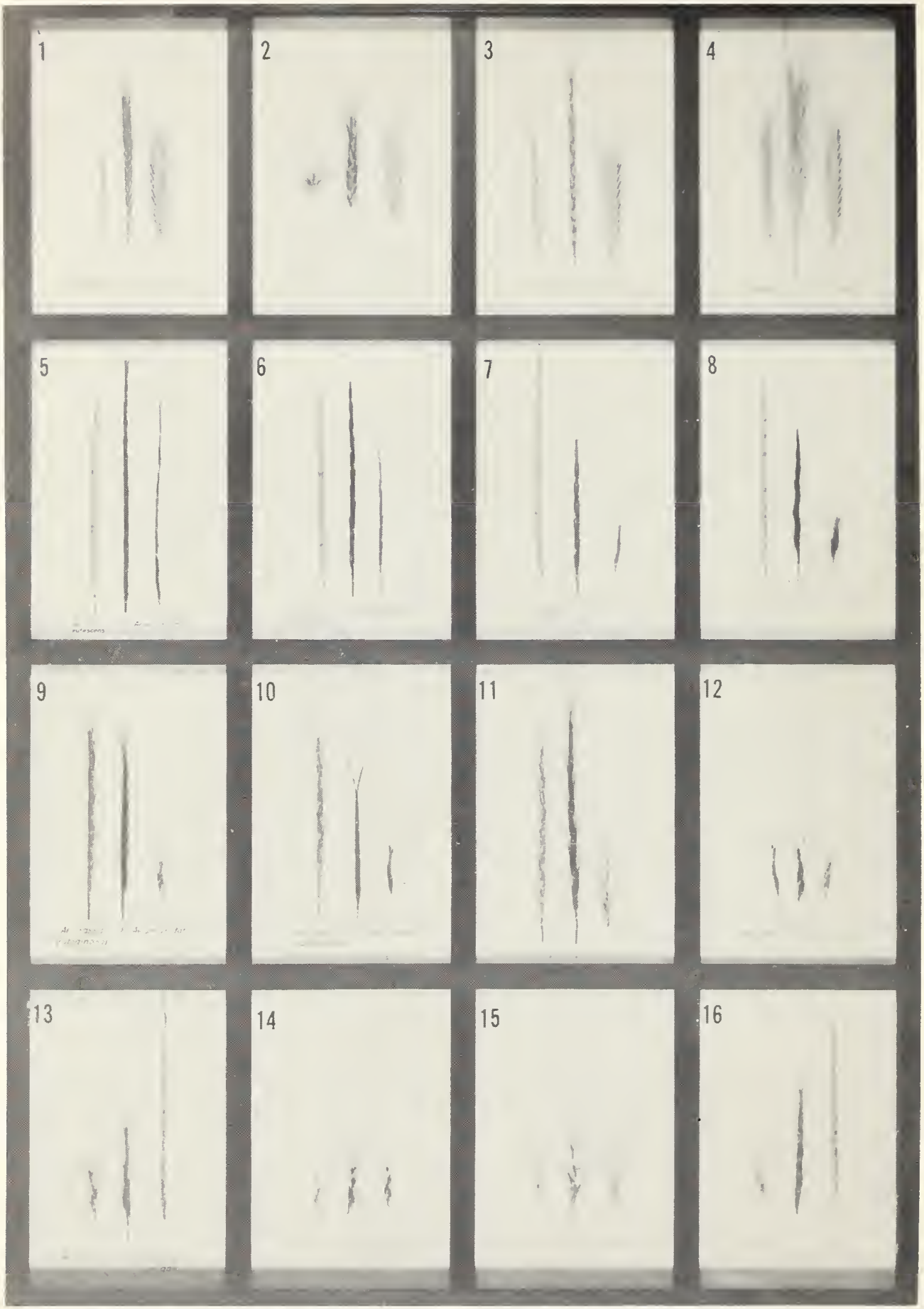

PLATE VI

Haynaldia villosum crossed with species of Aegilops and Secale; also crosses among species of Aegilops.

Fig. 1 Ae. bicornis, F_1, H. villosum

Fig. 2 Ae. ovata (nova), F_1, H. villosum

Fig. 3 Ae. ventricosa, F_1, H. villosum

Fig. 4 S. fragile, F_1, H. villosum

Fig. 5 Ae. crassa (rufescens), F_1, Ae. aucheri (virgata)

Fig. 6 Ae. crassa (rufescens), F_1, Ae. cylindrica

Fig. 7 Ae. crassa (rufescens), F_1, Ae. comosa

Fig. 8 Ae. crassa (rufescens), F_1, Ae. variabilis

Fig. 9 Ae. crassa (rubiginosa), F_1, Ae. uniaristata

Fig. 10 Ae. crassa (rubiginosa), F_1, Ae. comosa

Fig. 11 Ae. crassa (rubiginosa), F_1, Ae. columnaris

Fig. 12 Ae. comosa, F_1, Ae. uniaristata

Fig. 13 Ae. biuncialis, F_1, Ae. aucheri (virgata)

Fig. 14 Ae. biuncialis, F_1, Ae. triuncialis (brachyathera)

Fig. 15 Ae. biuncialis, F_1, Ae. columnaris

Fig. 16 Ae. biuncialis, F_1, Ae. crassa (rufescens)

PLATE VII

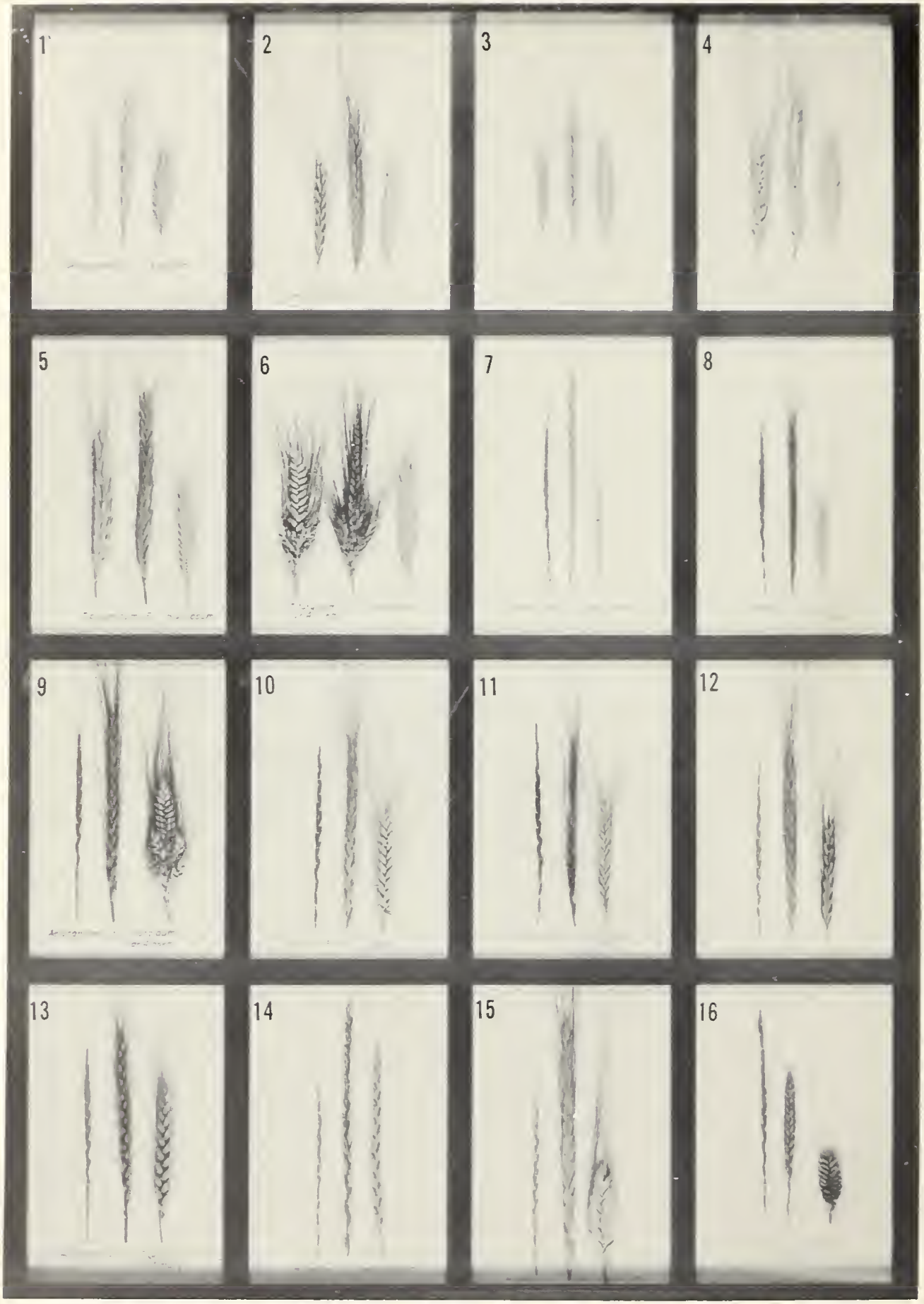

PLATE VII

Haynaldia villosum and Aegilops longissima crossed with species of Triticum.

Fig. 1 T. aegilopoides, F_1, H. villosum

Fig. 2 T. dicoccoides (spontaneonigrum), F_1, H. villosum

Fig. 3 T. dicoccum (Khapli), F_1, H. villosum

Fig. 4 T. durum (Kubanka), F_1, H. villosum

Fig. 5 T. polonicum, F_1, H. villosum

Fig. 6 T. turgidum (Alaska), F_1, H. villosum

Fig. 7 Ae. longissima, F_1, T. aegilopoides

Fig. 8 Ae. longissima, F_1, T. monococcum

Fig. 9 Ae. longissima, F_1, T. turgidum (Alaska)

Fig. 10 Ae. longissima, F_1, T. durum (Mindum)

Fig. 11 Ae. longissima, F_1, T. dicoccum (Khapli)

Fig. 12 Ae. longissima, F_1, T. dicoccoides

Fig. 13 Ae. longissima, F_1, T. vulgare (Nittany)

Fig. 14 Ae. longissima, F_1, T. spelta (Alstroum)

Fig. 15 Ae. longissima, F_1, T. polonicum (C.I. 7070)

Fig. 16 Ae. longissima, F_1, T. compactum (Dale Gloria)